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Demand Characteristics for Rice, Cowpea and Maize Seeds in Nigeria – Policy Implications and Knowledge Gaps

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Demand patterns for improved seed vary significantly among individual farmers in Sub-Saharan Africa because of the different capacity of farmers to overcome various constraints. Understanding these differences is crucial for speeding up the adoption by farmers of improved seed varieties. Although researchers have identified certain factors that explain regional demand differences in Sub-Saharan Africa, little is known about which of those factors apply to Nigeria, and how empirical research can fill the knowledge gap. This brief summarizes key characteristics of the demand for seed among rice, cowpea and maize producers in Nigeria. It also recommends improvements to Nigeria's seed distribution system that might help farmers obtain improved varieties on a timely basis.

Background

The adoption of improved seeds by farmers for growing rice, cowpea, and maize is slow in Nigeria. The low uptake is due to constraints in both the supply and demand for seeds. While the constraints in supply have been relatively well-studied, the constraints in demand have not been well understood.

In general, farmers seek seed from off-farm sources to replace seed that has been recycled over too many years, to change the crop variety, or to supplement stock that has been unexpectedly depleted. Choices made with respect to which varieties to buy, from whom, when to buy, and at what prices and quantities are individual farmer-specific or heterogeneous. This heterogeneity results from diversity in production and the market environments, as well as the varying ability of farmers to overcome constraints unique to each environment. Without proper understanding of these demand characteristics, the adoption of improved varieties in Nigeria will continue to be limited.

Following the characterization of seed demand in Eastern and Southern Africa by Minot et al (2007), this study explores the patterns for seed demand in Nigeria. This policy brief (1) identifies some of the key characteristics unique to cowpea, rice, and maize in Nigeria; (2) assesses demand patterns reported in existing studies for Nigeria; and (3) discusses how these characteristics may affect the design of seed sector policy in Nigeria.

Unique characteristics of Nigeria's rice, cowpea and maize seed demand

There are unique crop, country, and regional characteristics associated with rice, cowpea and maize that may influence the demand for these seeds in Nigeria (Table 1). Cowpea is almost unique to Nigeria and Niger, as the two countries account for 87 percent of the world's cowpea production. Cowpea is a self-pollinating crop like rice, but because of high storage losses farmers tend to buy the seeds every season instead of using recycled ones. Cowpea's seeding rate is high but its multiplication rate is low, and it takes many years to recover the seed stock through recycling once it is depleted (for example, as a result of natural or man-made disasters). Such stock depletion is therefore an important factor that explains the demand for cowpea seed. In addition, cowpea is a catch crop; that is, it is grown alongside of rice and maize. Therefore, the demand for cowpea seeds by farmers with a particular maturity length, and their decisions about when and how much to plant, are highly affected by their rice and maize crops.

Nigeria is one of the largest rice importers in the world, and higher international rice prices may significantly affect the demand for rice seed varieties. Rice production is also relatively labor-intensive in Nigeria as a result of the low level of mechanization, and therefore farmers tend to prefer varieties that help reduce the requirement for on-farm labor. For example, tall varieties of rice do not require farmers to bend as much at harvest time.

Maize is essentially consumed as food and not as fodder in West Africa. Its residue is also less valued as fodder compared to East Africa, for example. The demand for maize seed in Nigeria is therefore less affected by activities in the fodder and livestock markets. Both rice and maize have lower seeding but higher multiplication rates than cowpea, and the impact of seed stock depletion at home does not affect the demand for rice and maize seeds in subsequent years.

Aside from crop specific aspects, a unique characteristic regarding seed demand in Nigeria is that it has a large domestic seed market with a harmonized seed policy, which is more attractive to private seed companies that prefer to realize economies of scale from their seed sales. However, other West African countries are in the process of harmonizing their seed policy with counterparts in the Economic Community of West African States (ECOWAS), which may impact the situation in Nigeria. Private seed companies, however, tend to operate in the urban areas and their relatively larger presence in Nigeria leads to the more uneven seed market conditions within the country, thereby affecting the heterogeneity of farmers' demand for seed in Nigeria.

Table 1. Country, regional and crop-specific characteristics relevant for the seed sector

Aspects	Rice	Cowpea	Maize
Crop-specific aspects	• Self-pollinated • Relatively high labor-intensive cropping practices in Nigeria - attracts labor-easing varieties	• Self-pollinated • Significant loss in storage, particularly in low-humid tropics • High seeding rate • Low multiplication rate • Less sensitive to the availability of fertilizer • Catch-crop: factors that affect rice and maize will also affect cowpea	Open-pollinated
Nigeria- & West Africa-specific (by crop)	• Large imports of rice, making seed demand more sensitive to international rice price	• Residue is more valued as fodder in West Africa than in East Africa which is in contrast with maize • Ideal for semi-arid areas of West Africa, where soils are sandy and low in fertility	• Residue is less valued as fodder than in East Africa • 60% of maize in Nigeria is from high rain-forest zones
Nigeria-specific (all crops)	Large enough size of market – private company can realize scale of economy from Nigeria alone		

Seed demand characteristics in Sub-Saharan Africa with application to Nigeria

In Sub-Saharan Africa, three factors account for the demand for off-farm seeds: (a) seed replacement; (b) variety change; and (c) response to urgent depletion of seed stock at home (Table 2). However, beyond these three reasons, demand is highly heterogeneous among individual farmers, due to the high variation in productivity and differences in the level of risks associated with market failure. Such heterogeneity can generally be explained by five factors: market development, natural and man-made disasters, awareness about available improved varieties, agro-ecological factors, and farmers' preferences on timing or channels for buying seed (Table 2).

Although these factors have been studied in Sub-Saharan Africa, few Nigeria-specific empirical studies are available to help answer key questions dealing with which farmers are likely to demand particular seeds from the market, and in what quantities. Based on our review of existing studies, the following appear to be important factors dealing with the demand for seed by farmers in Nigeria:

Timing and channels

Timing and channels by and through which farmers can buy improved seeds are recognized as important factors. There is, however, limited empirical evidence on whether, and to what extent, they affect the demand for improved seed varieties.

Awareness of improved varieties

The awareness of improved seed varieties is relatively widely studied in Nigeria. In particular, several studies imply that the awareness of improved rice varieties may be low and demand for more contacts with extension activities is generally high. The awareness with respect to cowpea and maize is less studied and conclusions are mixed.

Emergencies

The effect of natural and man-made disasters is not well studied in Nigeria, although it is generally concluded that the most common types of disasters are wild fire, bush burning, sudden breakdown of resistance to pests, and thefts.

Table 2: Key Factors that Affect Farmers' Demand for Seed in Sub-Sahara Africa

Categories	Issues and Key Questions	Evidence in Nigeria		
		Rice	Cow-pea	Maize
Reasons for seed demand				
Seed replacement	How can we predict the frequency of seed recycling? How does the recycling frequency relate to observable characteristics of the producer?			
Variety change	How can we predict when a producer changes variety in the foreseeable future? How does the change relate to observable characteristics of the producer?			
Emergency response	Which farmers are experiencing unexpected depletion in their seed stock and thus need seed from outside?			
Heterogeneity in demand				
Market development	Given varying degree of development, low level of market integration; significantly different prices of seed, other complementary inputs and outputs across farmers; and consequently the demand for particular varieties vary greatly across farmers, how can such information help predict farmers' demand for improved seeds in different market environments?	×	×	×
Natural & manmade disaster	Farmers prefer to grow many varieties in small quantities and prefer to obtain seed at the time of planting. Is this the case in Nigeria?			
Awareness	Farmers may not demand improved seed because 1) they are not aware of it 2) they do not know where to obtain it although they want to buy it or 3) they prefer local varieties although they know about the improved seed and where to get it. What is the situation in Nigeria?	××	×	×
Agroecological	What are the key agro-ecological factors for rice, cowpea and maize production in Nigeria and how sensitive is the demand to such factors?	××	××	××
Channels and timing	Due to weak certification mechanism, farmers prefer to buy seed through certain channels and to buy seed right before the planting dates. Is this the case in Nigeria?	×	×	

(Blank = no empirical results were found so far:
× = some relevant empirical data but the questions not addressed as main foci of the report
×× = relevant empirical data and some reports address the questions as their main focus)

Implications for designing seed policy in Nigeria

Although the key factors that affect the demand for seed are relatively well-known, more empirical evidence is needed to understand the nature of other characteristics that are not well-known (Table 2). The relatively well-understood characteristics point to some of the relatively least-understood practices in each seed sector that may require more attention if farmers' needs are to be met (Table 3). They also help to clarify the knowledge gap for further research (Table 4).

Key principles for seed policy design and implementation

Seed policy along the seed supply chain must serve farmers' needs. Seed demand is known to be heterogeneous across regions and individuals, and therefore a seed policy needs to take these differences into consideration. Although agro-ecological factors are relatively well incorporated into seed production processes, policymakers need to pay more attention to farmers' socioeconomic characteristics, particularly with respect to seed marketing and information dissemination. A more decentralized seed system may better serve the varying needs of farmers. Private sector participation is crucial, and Nigeria has an advantage in attracting private companies because of its market size. Private seed companies have concentrated in urban areas, and therefore, some support from the government is needed to encourage these companies to move to the rural areas.

Research needs

Many key factors that determine the demand for improved varieties of rice, cowpea, and maize in Nigeria remain unknown (Table 4). The government could greatly improve seed demand predictions by obtaining more accurate information on farmers' seed replacement cycles, variety changes, and emergency responses. For example, while breeders, salespeople, and distributors know the *optimal* seed replacement cycle for particular varieties, the *actual* cycling period depends on farmers' production, marketing environments, and household characteristics. Similarly, one can partially predict which farmers are likely to change their seed variety, and when they are likely to do so from their household characteristics.

Research is also needed on farmers' awareness of improved varieties and the effect of the timing and channels through which they receive those seeds. Although farmers' awareness of improved seed has been relatively widely studied in Nigeria, particularly for rice, seed sector experts have mixed views as to the extent of farmer awareness of seed availability. Furthermore, many of the studies are not comparable because of the use of different methodologies. In addition, little is known about how much more farmers are willing to pay for having access to improved seed during the planting season, through the preferred channels of government and other farmers. Nigerian seed sector policy needs to put more emphasis on supporting domestic research institutions to gather the aforementioned information. The federal government needs to increase its budgetary allocation and to release such budget in a predictable and large enough fashion to enable local research institutions to conduct research that requires longer time span and lump-sum funding.

Table 3. Key principles requiring more attention for effective seed policy in Nigeria

Activity	Key recommendations suggested by characteristics of farmers' demand
Variety development, variety testing, on-farm testing	• Increase farmer-participation • Increase capacity to incorporate not only farmers' diverse production environments, but also their production, harvesting, and post-harvest marketing practices • Expand current trend of involving contract growers
Variety release	• Enhance capacity to release faster
Variety registration	• Simplify the registration process
Seed production seed processing & storage	• Increase farmer participation • Enhance capacity to incorporate not only farmers' diverse production environment, but also their production, harvesting and post-harvest marketing practices • Expand current trend of involving contract growers
Seed marketing	• Identify appropriate timing as well as establishment of a system to enable timely distribution to farmers • Identify appropriate channels as well as establishment of a system to enable distribution through right channels
Information dissemination	• Identify key leaders in the village and community • Disseminate information using in the local language at the timing farmers are less busy • Improve infrastructure for the radio coverage/reception in rural area • Identify farmers/regions with high urgent seed demand due to emergency (natural disaster, outbreak of pests, civil conflict) and share information on available varieties and accessibility • Improve farmers' literacy level • Support collective actions/organizations by farmers to reduce individual transaction costs
Seed quality control / certification	• Use voluntary certification
Workshop & training	• Increase substantial support to extension activities
Monitoring of seed program activities	• Increase support to the research/project evaluations • Increase support to strengthening local research institutions' capacity • Increase research in areas identified in Table 4

Table 4. Research area needs

Category	Type of empirical research missing in Nigeria
Seed replacement	Analysis to improve predictability of what types of farmers are likely to replace seed at what price given their observed characteristics
Variety change	Analysis to improve predictability of what type of farmers are likely to change the varieties given the available improved varieties
Emergency response	Analysis to improve predictability as to farmers in which regions are likely to need emergency seed at subsidized price and need public sector involvement in the seed distribution
Natural & man-made disaster	Assessment of frequency and intensity of such incidence, and their effects on farmers' seed demand behavior
Channels and timing	Assessment of whether farmers obtain seed through certain channels because they prefer (such as trust) or due to constraints (no access to other channels) Assessment of whether farmers prefer to obtain seed at certain times, and how much is the farmer willing to pay
Level of awareness	Analysis on whether farmers may not demand improved seed because 1) they are not aware of it, or 2) they do not know where to obtain although they want to buy, or 3) they prefer local varieties although they know the improved seed and where to get it

Reference

Minot N, Smale M, Eicher C, Jayne T, Kling J, Horna D, and Myers R. 2007. Seed development programs in sub-Saharan Africa: A review of experiences, prepared for the Rockefeller Foundation.

This brief is excerpted from a forthcoming IFPRI report on the characteristics of Nigerian farmers' demand for rice, cowpea and maize seeds — policy implications and knowledge gaps. It is intended to promote discussion; it has not been formally peer reviewed, but it has been reviewed by at least one internal and/or external reviewer.

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